

that carrier provides adequate criticality control by limiting the sum of the transport indexes to 50 in a non-exclusive use vehicle, and to 100 in an exclusive use vehicle.

(2) In excess of 10, that package may only be shipped by exclusive use vehicle or other shipper controlled system specified by DOT for fissile material packages. The shipper provides adequate criticality control by limiting the sum of the transport indexes to 100 in an exclusive use vehicle.

**§ 71.61 Special requirement for irradiated nuclear fuel shipments.**

A package for irradiated nuclear fuel with activity greater than 37 PBq ( $10^6$  Ci) must be so designed that its undamaged containment system can withstand an external water pressure of 2 MPa (290 psi) for a period of not less than one hour without collapse, buckling, or inleakage of water.

**§ 71.63 Special requirements for plutonium shipments.**

(a) Plutonium in excess of 0.74 TBq (20 Ci) per package must be shipped as a solid.

(b) Plutonium in excess of 0.74 TBq (20 Ci) per package must be packaged in a separate inner container placed within outer packaging that meets the requirements of Subparts E and F of this part for packaging of material in normal form. If the entire package is subjected to the tests specified in § 71.71 ("Normal conditions of transport"), the separate inner container must not release plutonium as demonstrated to a sensitivity of  $10^{-6}$  A<sub>2</sub>/h. If the entire package is subjected to the tests specified in § 71.73 ("Hypothetical accident conditions"), the separate inner container must restrict the loss of plutonium to not more than A<sub>2</sub> in 1 week. Solid plutonium in the following forms is exempt from the requirements of this paragraph:

- (1) Reactor fuel elements;
- (2) Metal or metal alloy;
- (3) Vitrified high-level waste contained in a sealed canister designed to maintain waste containment during handling activities associated with transport. As one method of meeting these design requirements, the NRC will consider acceptable a canister

which is designed in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section VIII, 1995 Edition (earlier editions may be used in lieu of the 1995 Edition). However, this canister need not be designed in accordance with the requirements of Section VIII, Parts UG-46, UG-115 through UG-120, UG-125 through UG-136, UW-60, UW-65, UHA-60, and UHA-65 and the canister's final closure weld need not be designed in accordance with the requirements of Section VIII, Parts UG-99 and UW-11. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies of the ASME Boiler and Pressure Vessel Code, Section VIII, 1995 Edition, may be purchased from the American Society of Mechanical Engineers, Service Center, 22 Law Drive, P.O. Box 2900, Fairfield, NJ 07007. It is also available for inspection at the NRC Library, 11545 Rockville Pike, Rockville, MD 20852-2738 or at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.; and

(4) Other plutonium bearing solids that the Commission determines should be exempt from the requirements of this section.

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**§ 71.64 Special requirements for plutonium air shipments.**

(a) A package for the shipment of plutonium by air subject to § 71.88(a)(4), in addition to satisfying the requirements of §§ 71.41 through 71.63, as applicable, must be designed, constructed, and prepared for shipment so that under the tests specified in—

(1) Section 71.74 ("Accident conditions for air transport of plutonium")—

(i) The containment vessel would not be ruptured in its post-tested condition, and the package must provide a sufficient degree of containment to restrict accumulated loss of plutonium contents to not more than an A<sub>2</sub> quantity in a period of 1 week;

(ii) The external radiation level would not exceed 10 mSv/h (1 rem/h) at a distance of 1 m (40 in) from the surface of the package in its post-tested condition in air; and

(iii) A single package and an array of packages are demonstrated to be subcritical in accordance with this part, except that the damaged condition of the package must be considered to be that which results from the plutonium accident tests in § 71.74, rather than the hypothetical accident tests in § 71.73; and

(2) Section 71.74(c), there would be no detectable leakage of water into the containment vessel of the package.

(b) With respect to the package requirements of paragraph (a), there must be a demonstration or analytical assessment showing that—

(1) The results of the physical testing for package qualification would not be adversely affected to a significant extent by—

(i) The presence, during the tests, of the actual contents that will be transported in the package; and

(ii) Ambient water temperatures ranging from 0.6°C (+33°F) to 38°C (+100°F) for those qualification tests involving water, and ambient atmospheric temperatures ranging from –40°C (–40°F) to +54°C (+130°F) for the other qualification tests.

(2) The ability of the package to meet the acceptance standards prescribed for the accident condition sequential tests would not be adversely affected if one or more tests in the sequence were deleted.

#### § 71.65 Additional requirements.

The Commission may, by rule, regulation, or order, impose requirements on any licensee, in addition to those established in this part, as it deems necessary or appropriate to protect public health or to minimize danger to life or property.

### Subpart F—Package, Special Form, and LSA–III Tests<sup>2</sup>

#### § 71.71 Normal conditions of transport.

(a) *Evaluation.* Evaluation of each package design under normal conditions of transport must include a determination of the effect on that design of the conditions and tests specified in

<sup>2</sup>The package standards related to the tests in this subpart are contained in subpart E of this part.

this section. Separate specimens may be used for the free drop test, the compression test, and the penetration test, if each specimen is subjected to the water spray test before being subjected to any of the other tests.

(b) *Initial conditions.* With respect to the initial conditions for the tests in this section, the demonstration of compliance with the requirements of this part must be based on the ambient temperature preceding and following the tests remaining constant at that value between –29°C (–20°F) and +38°C (+100°F) which is most unfavorable for the feature under consideration. The initial internal pressure within the containment system must be considered to be the maximum normal operating pressure, unless a lower internal pressure consistent with the ambient temperature considered to precede and follow the tests is more unfavorable.

(c) *Conditions and tests.*

(1) *Heat.* An ambient temperature of 38°C (100°F) in still air, and insolation according to the following table:

INSOLATION DATA	
Form and location of surface	Total insolation for a 12-hour period (g cal/cm <sup>2</sup> )
Flat surfaces transported horizontally:	
Base .....	None
Other surfaces .....	800
Flat surfaces not transported horizontally ..	200
Curved surfaces .....	400

(2) *Cold.* An ambient temperature of –40°C (–40°F) in still air and shade.

(3) *Reduced external pressure.* An external pressure of 25 kPa (3.5 lbf/in<sup>2</sup>) absolute.

(4) *Increased external pressure.* An external pressure of 140 kPa (20 lbf/in<sup>2</sup>) absolute.

(5) *Vibration.* Vibration normally incident to transport.

(6) *Water spray.* A water spray that simulates exposure to rainfall of approximately 5 cm/h (2 in/h) for at least 1 hour.

(7) *Free drop.* Between 1.5 and 2.5 hours after the conclusion of the water spray test, a free drop through the distance specified below onto a flat, essentially unyielding, horizontal surface, striking the surface in a position for which maximum damage is expected.